

Bainbridge Island Nearshore Habitat Characterization and Assessment

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Abstract

The City of Bainbridge Island is conducting a seminal nearshore characterization and assessment project funded through the Salmon Recovery Funding Board. The primary objective of this effort is to provide baseline data upon which to develop and implement nearshore management strategies (including restoration and preservation) and measure management success. A science-based conceptual framework was used to characterize the status of shoreline ecological functions based upon systematic evaluations of shoreline modifications, controlling factors, habitat structure, and habitat processes. Approximately 48.5 miles of shoreline was broken down into nine management units (based on drift cell knowledge) and each unit was analyzed by reach (based on the WADNR ShoreZone Inventory). Digital data, including the Bainbridge Island Nearshore Structure Inventory, was quantified using GIS which was in turn used to conduct a qualitative (3-tier) assessment using defensible, systematic matrices. The qualified measures were based on quantified parameters derived from the literature, current and historical shoreline photos, and expert opinion. This information was synthesized to determine human impacts, locating critical areas for protection or restoration, and identifying nearshore ecosystems most at risk to cumulative impacts. Based on readily available or easily collectable data, this approach could provide a useful framework for similar assessments in Puget Sound.

Extended Abstract

Introduction

The City of Bainbridge Island is conducting a seminal project aimed at establishing procedures for characterizing and assessing conditions of its nearshore habitats and resources. The primary objective of this effort is to provide baseline data upon which to develop and implement nearshore management strategies (including restoration and preservation) and measure management success. This evaluation will also provide a framework for prioritizing sites for future preservation and restoration along the 48-mile-plus-long shoreline, and provide the basis for updating the city's Shoreline Master Program.

Approach

The nearshore assessment builds upon a summary of the best available science (BAS), which summarizes the existing scientific literature as it relates to the nearshore environment of Bainbridge Island (Williams et al. 2003). As such, the assessment employs the conceptual model of Williams and Thom (2001) to build a scientifically defensible framework for assessing the potential effects of changes caused by shoreline modifications on nearshore biological functions. The nearshore conceptual model was used to characterize the status of shoreline ecological functions, based upon systematic evaluations of shoreline modifications, controlling factors, habitat structure, and habitat processes.

Spatial scale, geomorphic context, and current quantitative data were critical to guiding the approach. The shoreline was broken down into nine management units (MUs), based on drift cell knowledge, with assessments conducted at a "reach" scale defined by ShoreZone units from the WDNR database (WDNR 2001). Geomorphic classification of reaches, derived from the ShoreZone database in concert with aerial photographs and local knowledge, provided a context that refined predictive relationships between shoreline modifications and nearshore functions, as well as a context for predicting historic conditions. Fine-scale, geo-referenced data collected by COBI was the basis for quantifying nearshore habitat modifications and habitat structural attributes (Best 2003). Land use cover classifications from Kitsap County, digital data from ShoreZone, and historic photographs provided additional information for verifying assumptions and completing our picture of nearshore conditions.

The status of nine controlling factors (wave energy, light regime – shading, light regime - increase, sediment supply, substrate type, depth/slope, pollutants/nutrients, hydrology, physical disturbance) within each shoreline reach was scored using quantitative data guided by geomorphic context and expert opinion. Normalized assessment scores provided a

relative measure (0 = no issue, 0.3 = some concern, 0.6 = moderate concern, 1.0 = high concern) of the level of concern relative to impacts on shoreline controlling factors.

Summary Findings

Preliminary findings and conclusions from the study are summarized below:

- Approximately 53% of the 256,545 linear ft shoreline of BI was modified by armoring, with vertical riprap composing 30% of this total, followed by vertical concrete (21%) and revetments (2%). Armoring levels reflected the same trend at the reach level, with the average reach composed of 54% armoring (high 100%, low 0%, median 55.4%).
- Over 2,900 point modifications were recorded along BI shorelines, at an average of 12 structures per 1000 ft. The most common structure was classified as an upland structure at the waterline (526), followed by over-water structures such as docks or piers (700) and outfalls (177).
- Within the 200-ft buffer zone upland of the BI shoreline, impervious surfaces (e.g., roads, roofs) composed almost 25% of the land cover, whereas naturally vegetated surfaces (coniferous and deciduous trees, shrubs, and wetlands) composed slightly over 50% of landcover.
- The normalized controlling factor scores of reaches Island-wide ranged from 0.0 to 1.0 and averaged 0.58 (median 0.61).
- The average reach score by management unit (normalized) was 0.56, with scores ranging from 0.43 at Murden Cove (MU-4) and Blakely Harbor (MU-6) to 0.74 in Eagle Harbor (MU-5).
- Preliminary graphs suggest correlations between high controlling factors scores and reduced ecological function (e.g., habitat diversity, forage fish spawning). However, there is a need for better ecological indicators scaled to reaches (e.g., salmon use, habitat condition), as well as empirical studies to verify these relationships.
- Guidance by local experts is still needed to refine reach evaluations and scoring criteria before the final assessment is completed.
- Knowledge of impacts at a local (reach) and landscape (drift-cell based management unit) scale is providing a useful framework for developing a prioritization scheme for restoration and preservation activities.
- This assessment approach is proving to be of high utility to managers and land use planners in developing defensible regulations that meet science-based performance standards.

The final report will be completed in July 2003 after further peer review and revisions. Electronic and limited print copies of the final report can be obtained via the web at www.ci.bainbridge-isl.wa.us or by contacting the City of Bainbridge Island Department of Planning & Community Development, ph: (206) 842-2552, email: pcd@ci.bainbridge-isl.wa.us.

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